is therefore probably transmissible to their offspring." But how is the restriction to be effected? The authors answer: By segregation, sterilisation in certain cases, and a good banns law. Besides these coercive methods, the first of which is regarded as urgently necessary, the authors look to an increasingly enlightened social conscience. The objections to coercive methods are considered in a fair-minded and temperate manner, but we confess to have less faith than the authors have in the wisdom of tribunals. We should not like our neighbours to decide whether we are to have permission to marry, and it is well known that such conditions as feeble-minded and epileptic are not very precise. It is interesting to speculate what human history would have been if eugenics boards had segregated—well, perhaps we had better not mention names.

On the positive side the authors write admirably. Sex-selection is a reality; if it were better educated and given wider opportunities, it might become a very potent factor in racial progress. To promote a higher marriage-rate among superiors, the authors make a plea for clean living, for simpler living, for a wider education of faculties, for a franker approbation of the married state as more normal than celibacy, and against the persistent prolongation of the training period beyond the early twenties. At the same time, the authors assure us that the people, as a whole, are not marrying less than they used to do; what is wrong is postponement or avoidance of marriage among the more individuated. Not only so, but when they marry they do not have enough children. They do not want to, and the reasons for this are not wholly selfish. A careful analysis is submitted, and attention is directed to the desirability of certain educational and economic changes which may counteract the tendency to race-suicide. There is a point here that seems to be often overlooked in regard to eugenic education. The authors say: "Perhaps the time is not so far distant when babies will be considered an integral part of a girl's curriculum." But while that may be very useful for the girls who marry, is it not apt to be a refined cruelty towards the many who find no mates?

The authors go on to discuss, in relation to eugenics, such subjects as the colour line, immigration, and war—all with the objectivity, scholarship, and fair-mindedness that are characteristic of the whole book. There is a useful chapter on the value of genealogical outlook, both ethically and scientifically. Preoccupation with it may lead to loss of perspective; but to call genealogy a fad is a betrayal of foolishness and vulgarity. The authors' studies end with an emphasis on good environment (euthenics), and this corrects what seems to us a slight partiality in the early chapters. We strongly recommend the book as an all-round, well-documented, level-headed answer to the question: What is practicable in the way of eugenics?

## The First Great Alpine Traveller.

*The Life of Horace Bénédict de Saussure.* By D. W. Freshfield, with the collaboration of H. F. Montagnier. Pp. xii+479. (London: Edward Arnold, 1920.) Price 25*s.* net.

A LIFE of de Saussure, author of the "Voyages dans les Alpes," has long been desired, and that has now been supplied by an Englishman singularly fitted for the task, Dr. Douglas Freshfield, who was incited so long ago as 1875 by Ruskin, and has been ever since, directly or indirectly, gathering materials. The handsome volume before us is the result. No one has a better knowledge of mountains than Dr. Freshfield, for when a boy, in 1859 and 1860, he accompanied his father and mother on riding tours through several parts of the Alps, and has repeatedly returned thither. He has also explored many other mountain chains, and has published his experiences. In 1869 he described a journey through the Central Caucasus and Bashan, in the course of which he ascended Kasbek and one of the twin summits of Elbruz. In 1896 he published his splendid work on "The Exploration of the Caucasus," and his journey of 1899 "Round Kangchenjunga" was yet more adventurous, though rendered rather less successful by persistently bad weather; while since then, in "Hannibal Once More," he has discussed the route of the Carthaginian general across the Alps, suggesting one considerably south of those generally supported, for which there is undoubtedly much to be said.

Horace Bénédict de Saussure, born at Geneva in 1740, was a man of good family, strong intellect, and remarkably wide education. He could write with ease both Latin and Greek; in addition to French, he knew German, Dutch, and English well enough to converse easily with the educated men of each country, and had a wide knowledge for that day of mathematics, metaphysics, and natural science, especially geology, mineralogy, and chemical physics. In his youth, though the summit of Mont Blanc was visible from the quay of Geneva, very few travellers had penetrated so far as Chamonix until, in 1742, an English party proved

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that the glaciers of Savoy more than rivalled those of Grindelwald, already known through Scheuchzer's "Itinera Alpina."

De Saussure married early, and as his wife added to his means he was able to gratify his love for travel. Though at times suffering from dyspepsia, he had a strong constitution, and was for more than ten years after 1774 able to lead, with but one interruption, "a life of various activity as a hard-working professor, a man of science, a citizen, and a mountain traveller." In this time he made his principal Alpine explorations, which culminated in 1787–88 and 1789 in the ascent of Mont Blanc, the stay for thirteen days on the Col du Géant, and the tour of Monte Rosa. But evil times were approaching, for the Revolution in France soon found its imitators at Geneva. De Saussure's sense of duty drew him into politics in the vain hope of averting their evils, with the result that he was impoverished and his life more than once in peril. Dr. Freshfield gives us the pitiful story in all its details until in 1794 de Saussure had a stroke of paralysis which, though his brain remained clear and he was able to write two volumes of his "Voyages" and to seek alleviation by visiting baths, ultimately proved fatal on January 22, 1799.

Dr. Freshfield has spared no pains in accomplishing his task, which has evidently been to him a labour of love. De Saussure was the great forerunner of scientific Alpine exploration—a man better qualified than any successor until the days of Principal J. D. Forbes. The latter corrected some of the mistakes into which his illustrious predecessor had fallen, and put the question of glacier motion on a surer footing, about the year 1843, in his "Travels through the Alps of Savoy and other Parts of the Pennine Chain." This gave an increasing stimulus to Alpine travel, which culminated in the foundation of the Alpine Club in 1857, since which date scientific investigation of the Alps and the conquest of mountain difficulties have made wonderful progress. It is scarcely more than 120 years since de Saussure died, yet the pictures representing him on his greatest glacier excursion, and some of his geological speculations, seem to us strangely antiquated. Nevertheless they show him to have been a man of true courage and of a really scientific mind; and this reference to pictures reminds us that Dr. Freshfield has added to the value of his work by a number of well-selected illustrations, among which are not only excellent portraits of de Saussure and of some of his relations and friends, but also representations of places of interest in his history.

T. G. BONNEY.

## X-Ray Analysis and Mineralogy.

*Lehrbuch der Mineralogie.* By Prof. P. Niggli. Pp. xii+694. (Berlin: Gebrüder Borntraeger, 1920.) Price 80 marks.

THIS book, written by the professor of mineralogy and petrography at the University and "Technischen Hochschule" of Zurich, but published in Berlin, is a comprehensive work of some originality. It is illustrated by a large number of figures, which are practically all reproductions of drawings made by the university artist from material supplied by the author. The result is doubtless effective from the author's point of view and for rapid production, but the illustrations are much coarser than would satisfy an average author or publisher in this country, especially in the case of so large and expensive a book.

The work possesses a particular value, however, as being that of a colleague of Prof. Laue, who was called from Munich, after his discovery of the diffraction of X-rays by the planes of atoms in crystals, to become professor of physics at Zurich University, and this fact is revealed by the constant references to the analysis of crystals by X-rays. Indeed, it must prove somewhat embarrassing and bewildering to a student who is not of some years' standing in scientific study to find in the first few pages statements which really embody the complex results of the most recent research—on the structure of the atom, or on the screw-structure of certain point-systems, for instance—alongside the most elementary treatment of the properties of crystals. It amounts more or less to the revelation of their innermost point-system and space-lattice structure before even the obvious characters and attributes of crystals have been touched upon.

The book is, indeed, in its general character, very like a collection of notes for lectures, illustrated by wall diagrams, only very rarely going into any detail with the subject in hand at the moment. Even the names of original authorities, when mentioned at all, are only given as an afterthought in brackets, or in an occasional note in small print, while references to published memoirs are entirely absent. However, a list of textbooks and works of reference is given at the end of the book. The lecture-room impression is still further emphasised by the large amount of tabular matter in the book. Thus the historic sequence of the acquirement of our knowledge of crystals is practically ignored, and information of all kinds—old and new, some easy of comprehension and some quite beyond the understanding of all but those well versed in the elements of the

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